COGNITIVE FUNCTIONING OF CHILDREN WITH SCOTOPIC SENSITIVITY SYNDROME

SYNOPSIS

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INTRODUCTION

The scotopic sensitivity syndrome is seen mostly in children as well as in adults' population. It affects male and female equally. This disorder is enhanced by the environmental stressors such as lighting, contrast, colours, patterns, amount of print on page demands for continuous performance, demands for comprehension, print size, style and format. People with this syndrome face many problems in their days to day life and in their academic and occupational performance.

IRLEN SYNDROME

Irlen syndrome, occasionally referred to as scotopic sensitivity syndrome (SSS) or Meares-Irlen syndrome, very rarely as asfedia, and recently also as visual stress, is a proposed disorder of vision. It is not recognised by any scientific or medical body.

Scotopic sensitivity syndrome is based on the theory that some individuals have hypersensitive photoreceptors, visual pathways, and/or brain systems that react inappropriately to some wavelengths of light. Vision occurs when photons are detected by the retina, initiating a biochemical process affecting the visual pathways and deep structures of the brain.

In simple terms, the theory is that some signals from the eye are not getting to the brain intact and/or on time. Although the eye might be functioning correctly, the brain receives what is like a double exposed picture where the location of items is confused. The brain tries to filter out the bad information and so the conscious mind receives a reconstructed image. That image may be of the items moving (the brain constantly changing its best guess of what is there), blurred outcomes (inability to form a view of what is there), gaps in wrong spots, and a variety of other minor errors.

There may also be exhaustion (from the mental effort to unscramble) and sore eyes (from the eyes constantly seeking extra data to aid the process). The problem is worst where different colours do not all give a similar outcome. In nature you get a lot of consistent data but on a man-made item (paper, for example) there might be only a limited colour set: the condition does not generate practical problems where there are lots of redundant data for the brain to use.

The pragmatic response by Irlen was not to try to fix the problem but to avoid it. By filtering out the light most likely to generate problem signals to the brain, she was able to improve the likelihood that the brain will correctly distinguish between good and bad information. It also seems likely that in some individuals, over time the brain learns which colours are the problem items and improves its ability to reconstruct an accurate image.

Visual processing problems in people with dyslexia is becoming a more accepted area of research, with most authorities accepting the possibility of at least some degree of visual impairment in large numbers of people with dyslexia. It has been hypothesised that the identified symptoms may be related to retinal malfunction. Grosser and Spafford (1990) identified extra peripheral retinal cones in subjects with dyslexia, which they claimed may lead to letter images in peripheral vision competing with letter images in central vision. Irvine and Irvine (1997) suggested a variety of possible retinal problems for people with symptoms of IS, including signal interference between adjacent receptor cells and abnormalities in receptor distribution.

There are many studies which indicate that people with Irlen syndrome faces many problems like reduced working memory, ability to recognized facial expression, and attention deficits etc. The colored sheets or overlays are helpful in reducing these problems in people having Irlen syndrome.

AUTHOR	YEAR	FINDINGS
Kruk et al.	2008	Suggested that visual perceptual measures involving visual memory and discrimination predict independent variance in reading achievement provides a basis to examine their relationships with the diagnostic criteria of MISViS. This study examined the visual processing characteristics in 36 eight- to ten-year-old children, half of whom were experiencing reading difficulty. Children were assessed for MISViS by Irlen screeners; approximately half of the participants in each group were positively identified. Concurrent performance on standardized visual processing tests showed that while a positive diagnosis of MISViS is not indicative of reading ability, nor in particular of a visual-processing deficit

		subtype identified by Watson and MISViS can indicate visual processing difficulties potentially related to visual attention inefficiency.
Robinson and Whiting	2003	This study investigated children aged 8 to 12 years who were divided into three learning disability sub-groups: 1) a visual-perceptual sub-type called Irlen Syndrome (n=41); 2) a group with learning disabilities, but no indications of Irlen Syndrome (n=30); and 3) a normally achieving control group (n=31). The Irlen Syndrome sub-group had significantly lower scores for interpreting emotion from facial expression than the two other groups. The learning disabled non-lrlen sub-group also had significantly lower scores than the control group, but with much smaller levels of significance than those between the Irlen and control groups.
Shoemaker	2001	Found that the problems with concentration, confusion and short-term memory, overlap with symptoms commonly observed in children diagnosed with learning difficulties.
Evans et al.	1999	Suggested that colored filters determines benefit in about 80% of individuals using them. The adoption of colored overlays/filters in schools is incremented given that the visual stress syndrome – which symptoms they are supposed to alleviate – is often observed in dyslexic students.

LEARNING DISABILITY

Representatives of organizations committed to the education and welfare of individuals with learning disabilities are known as National Joint Committee on Learning Disabilities (NJCLD). The NJCLD used the term 'learning disability' to indicate a discrepancy between a child's apparent capacity to learn and his or her level of achievement. Types of learning disorders include reading (dyslexia), mathematics (dyscalculia) and writing (dysgraphia). Reading disorder is the most common learning disability.

READING DISABILITY

A reading disability is a condition in which a sufferer displays difficulty reading resulting primarily from neurological factors. Developmental Dyslexia, Alexia (acquired

dyslexia), and Hyperlexia. A reading disability can affect any part of the reading process, including difficulty with accurate or fluent word recognition, or both, word decoding, reading rate, prosody (oral reading with expression), and reading comprehension. Before the term "dyslexia" came to prominence, this learning disability used to be known as "word blindness."

National Institute of Neurological Disorders and Stroke defines reading disability or dyslexia as follows: "Dyslexia is a brain-based type of learning disability that specifically impairs a person's ability to read. These individuals typically read at levels significantly lower than expected despite having normal intelligence. Although the disorder varies from person to person, common characteristics among people with dyslexia are difficulty with spelling, phonological processing (the manipulation of sounds), and/or rapid visual-verbal responding.

In adults, dyslexia usually occur after a brain injury or in the context of dementia. It can also be inherited in some families, and recent studies have identified a number of genes that may predispose an individual to developing dyslexia."

The Rose Review 2009 definition is more in keeping with modern research and debunked discrepancy model of dyslexia diagnosis (Stanovich, 1991). Dyslexia is a learning difficulty that primarily affects the skills involved in accurate and fluent word reading and spelling.

Characteristic features of dyslexia are difficulties in phonological awareness, verbal memory and verbal processing speed. Dyslexia occurs across the range of intellectual abilities. It is best thought of as a continuum, not a distinct category, and there are no clear cut-off points. Co-occurring difficulties may be seen in aspects of language, motor co-ordination, mental calculation, concentration and personal organisation, but these are not, by themselves, markers of dyslexia. A good indication of the severity and persistence of dyslexic difficulties can be gained by examining how the individual responds or has responded to well-founded intervention.

LEARNING DISABILITY INCLUDES THE PRESENCE OF:

- A significantly reduced ability to understand new or complex information in learning new skills (impaired intelligence), with:

- A reduced ability to cope independently (impaired social functioning),
- Which started before adulthood, with a lasting effect on development'

Specific learning disorder is diagnosed through a clinical review of the individual's developmental, medical, educational, and family history, reports of test scores and teacher observations, and response to academic interventions. The diagnosis requires persistent difficulties in reading, writing, arithmetic, or mathematical reasoning skills during formal years of schooling. Symptoms may include inaccurate or slow and effortful reading, poor written expression that lacks clarity, difficulties remembering number facts, or inaccurate mathematical reasoning.

Current academic skills must be well below the average range of scores in culturally and linguistically appropriate tests of reading, writing, or mathematics. The individual's difficulties must not be better explained by developmental, neurological, sensory (vision or hearing), or motor disorders and must significantly interfere with academic achievement, occupational performance, or activities of daily living.

The DSM-V definition of 'Intellectual Disability' refers to limited functioning in three areas:

- Social skills (e.g. communicating with others)
- Conceptual skills (e.g. reading and writing ability)
- Practical ability (e.g. clothing/bathing one's self)

The reading disability may be caused by some reasons like:

Heredity

- Learning disabilities often run in the family. Children with learning disabilities are likely to have parents or other relatives with similar difficulties.

Problems during pregnancy and birth

- Learning disabilities can result from anomalies in the developing brain, illness or injury, fetal exposure to alcohol or drugs, low birth weight, oxygen deprivation, or by premature or prolonged labour.

Accidents after birth

- Learning disabilities can also be caused by head injuries, malnutrition, or by toxic exposure (such as heavy metals or pesticides).

Thus all these causes are the main causes of the disorder to occur in children.

DYSLEXIA

Dyslexia is a learning disability that manifests itself as a difficulty with word decoding and/or reading fluency. Comprehension may be affected as a result of difficulties with decoding, but is not a primary feature of dyslexia. It is separate and distinct from reading difficulties resulting from other causes, such as a non-neurological deficiency with vision or hearing, or from poor or inadequate reading instruction (McCandliss& Noble,2003).

Dyslexia has been proposed to have three cognitive subtypes (auditory, visual and attentional), although individual cases of dyslexia are better explained by the underlying neuropsychological deficits and co-occurring learning disabilities (e.g. attention-deficit/hyperactivity disorder, math disability, etc. Valdois et al. 2004). Although not an intellectual disability, it is considered both a learning disability and a reading disability (Heim, 2008). Dyslexia and IQ are not interrelated, since reading and cognition develop independently in individuals who have dyslexia (Grigorenko,2003).

DIAGNOSTIC CRITERIA OF DYSLEXIA

According to the American Psychiatric Association, the diagnostic criteria for Reading Disorder (Dyslexia) are as follows (DSM-IV, 1994):

- Reading achievement, as measured by individually administered standardized tests of reading accuracy or comprehension, is substantially below that expected given the person's chronological age, measured intelligence, and age-appropriate education.
- The disturbance in Criterion A significantly interferes with academic achievement or activities of daily living that require reading skills.
- If a sensory deficit is present, the reading difficulties are in excess of those usually associated with it (the specific sensory deficit).
- Usually apparent by age 7 (2nd grade), sometimes age 6 (1st grade) DSM-III, 1987).
- Sometimes up to age 9 if a Developmental Reading Disorder is compensated for in school (DS-III-R, 1987).

PREVALENCE:

- 3% to 6% of school-aged children (Council on Scientific Affairs, 1989)
- 4% of school-aged children (DSM-IV, 1994).
- 40% to 70% of those participating in prison programs ("Dyslexia and the adult learner," 1994).
- 60% and more of those in adult literacy programs ("Dyslexia and the adult learner," 1994).
- 40% to 60% of those in basic adult education programs ("Dyslexia and the adult learner" 1994).

Thus this disorder may occur in school aged children as well as in adults as acquired dyslexia.

WORKING MEMORY

Working memory, a core executive function, is a cognitive system with a limited capacity that is responsible for the transient holding, processing, and manipulation of information (Diamond, 2013). Working memory is an important process for reasoning and the guidance of decision making and behavior (Malenka, 2009). Working memory is often used

synonymously with short-term memory, but neuropsychologists have noted that the two forms of memory are distinct, particularly since they arise from different neural subsystems within the prefrontal cortex. Working memory is a short-term memory buffer that allows for the manipulation of stored information, while short-term memory is only involved in the short-term storage of information and does not entail the manipulation or organization of material held in memory (Nelson,2008). Working memory also develops later and at a slower pace than short-term memory.

The term "working memory" was coined by Miller, Galanter, and Pribram and was used in the 1960s in the context of theories that likened the mind to a computer. In 1968, Atkinson and Shiffrin used the term to describe their "short-term store". What we now call working memory was formerly referred to variously as a "short-term store" or short-term memory, primary memory, immediate memory, operant memory, and provisional memory (Joaquin,2008). Short-term memory is the ability to remember information over a brief period (in the order of seconds). Most theorists today use the concept of working memory to replace or include the older concept of short-term memory, marking a stronger emphasis on the notion of manipulating information rather than passive maintenance.

The earliest mention of experiments on the neural basis of working memory can be traced back to more than 100 years ago, when Hitzig and Ferrier (1974) described ablation experiments of the prefrontal cortex (PFC); they concluded that the frontal cortex was important for cognitive rather than sensory processes. In 1935 and 1936, Carlyle Jacobsen and colleagues were the first to show the deleterious effect of prefrontal ablation on delayed response.

Working memory is generally considered to have limited capacity. The earliest quantification of the capacity limit associated with short-term memory was the "magical number seven" suggested by Miller in 1956. He claimed that the information-processing capacity of young adults is around seven simultaneous elements, which he called "chunks", regardless whether the elements are digits, letters, words, or other units. Later research revealed this number depends on the category of chunks used (e.g., span may be around seven for digits, six for letters, and five for words), and even on features of the chunks within a category. For

instance, span is lower for long than short words. In general, memory span for verbal contents (digits, letters, words, etc.) strongly depends on the time it takes to speak the contents aloud, and on the lexical status of the contents (whether the contents are words known to the person or not) (Hulme,1995). Several other factors affect a person's measured span, and therefore it is difficult to pin down the capacity of short-term or working memory to a number of chunks. Nonetheless, Cowan proposed that working memory has a capacity of about four chunks in young adults (and fewer in children and old adults)(Nelson,2011).

Whereas most adults can repeat about seven digits in correct order, some individuals have shown impressive enlargements of their digit span—up to 80 digits. This feat is possible by extensive training on an encoding strategy by which the digits in a list are grouped (usually in groups of three to five) and these groups are encoded as a single unit (a chunk). For this to succeed, participants must be able to recognize the groups as some known string of digits. One person studied by Ericsson and his colleagues, for example, used an extensive knowledge of racing times from the history of sports in the process of coding chunks: several such chunks could then be combined into a higher-order chunk, forming a hierarchy of chunks. In this way, only some chunks at the highest level of the hierarchy must be retained in working memory, and for retrieval the chunks are unpacked. That is, the chunks in working memory act as retrieval cues that point to the digits they contain.

Practicing memory skills such as these does not expand working memory capacity proper: it is the capacity to transfer (and retrieve) information from long-term memory that is improved, according to Ericsson and Kintsch (1995). Working memory capacity is typically seen as a stable trait within an individual and is greatly influenced by genetic makeup. The capacity of working memory is also affected by situational factors like stress or anxiety which can inhibit success. It is also important to note that capacity of working memory generally increases with age. When using different materials, the person who could recall 80 digits was not exceptional when it came to recalling words.

Thus working memory focuses on the transient holding, processing, and manipulation of information.

ATTENTION

Research suggests a close link between the working memory capacities of a person and their ability to control the information from the environment that they can selectively enhance or ignore. Such attention allows for example for the voluntarily shifting in regard to goals of a person's information processing to spatial locations or objects rather than ones that capture their attention due to their sensory saliency (such as an ambulance siren).

Attention is best described as the sustained focus of cognitive resources on information while filtering or ignoring extraneous information. Attention is a very basic function that often is a precursor to all other neurological/cognitive functions.

Attention has to do with the immediate experience of the individual; it is a state of current awareness. There are, of course, many events taking place in the world all the time, each impinging upon a person’s senses. There are also events taking place within the body that affect attention, just as there are representations of past events stored in one’s memory but accessible to awareness under appropriate circumstances.

Attention is the behavioral and cognitive process of selectively concentrating on a discrete aspect of information, whether deemed subjective or objective, while ignoring other perceivable information. It is the taking possession by the mind in clear and vivid form of one out of what seem several simultaneous objects or trains of thought. Focalization, concentration of consciousness are of its essence. Attention has also been referred to as the allocation of limited processing resources (Anderson, John, 2004).

As is frequently the case, clinical models of attention differ from investigation models. One of the most used models for the evaluation of attention in patients with very different neurologic pathologies is the model of Sohlberg and Mateer (1989). This hierarchic model is based in the recovering of attention processes of brain damage patients after coma. Five different kinds of activities of growing difficulty are described in the model; connecting with the activities those patients could do as their recovering process advanced.

- **Focused attention**: The ability to respond discretely to specific visual, auditory or tactile stimuli.
- **Sustained attention (vigilance and concentration)**: The ability to maintain a consistent behavioral response during continuous and repetitive activity.
- **Selective attention**: The ability to maintain a behavioral or cognitive set in the face of distracting or competing stimuli. Therefore, it incorporates the notion of "freedom from distractibility."
- **Alternating attention**: The ability of mental flexibility that allows individuals to shift their focus of attention and move between tasks having different cognitive requirements.
- **Divided attention**: This is the highest level of attention and it refers to the ability to respond simultaneously to multiple tasks or multiple task demands.

This model has been shown to be very useful in evaluating attention in very different pathologies, correlates strongly with daily difficulties and is especially helpful in designing stimulation programs such as attention process training, a rehabilitation program for neurological patients of the same authors.

In 1890, William James, in his textbook The Principles of Psychology, remarked:

“Everyone knows what attention is. It is the taking possession by the mind, in clear and vivid form, of one out of what seem several simultaneously possible objects or trains of thought. Focalization, concentration, of consciousness are of its essence. It implies withdrawal from some things in order to deal effectively with others, and is a condition which has a real opposite in the confused, dazed, scatter-brained state which in French is called distraction, and Zerstreutheit in German”.

Thus attention can be selective, dividing and altering and is the present state of awareness.

FACIAL EXPRESSION

A facial expression is one or more motions or positions of the muscles beneath the skin of the face. Facial expressions are a form of nonverbal communication. They are a primary means of conveying social information between humans, but they also occur in most other mammals and some other animal species. (For a discussion of the controversies on these claims.

Facial recognition is often an emotional experience for the brain and the amygdala is highly involved in the recognition process. The eyes are often viewed as important features of facial expressions. Aspects such as blinking rate can be used to indicate whether or not a person is nervous or whether or not he or she is lying. Also, eye contact is considered an important aspect of interpersonal communication. However, there are cultural differences regarding the social propriety of maintaining eye contact or not.

Beyond the accessory nature of facial expressions in spoken communication between people, they play a significant role in communication with sign language. Many phrases in sign language include facial expressions in the display. Facial expressions are vital to social communication between humans. They are caused by the movement of muscles that connect to the skin and fascia in the face. These muscles move the skin, creating lines and folds and causing the movement of facial features, such as the mouth and eyebrows. These muscles develop from the second pharyngeal arch in the embryo. The temporalis, masseter, and internal and external pterygoid muscles, which are mainly used for chewing, have a minor effect on expression as well. These muscles develop from the first pharyngeal arch (Rinn and William, 1984).

There are two brain pathways associated with facial expression; the first is voluntary expression. Voluntary expression travels from the primary motor cortex through the pyramidal tract, specifically the corticobulbar projections. The cortex is associated with display rules in emotion, which are social precepts that influence and modify expressions. Cortically related expressions are made consciously.

The second type of expression is emotional. These expressions originate from the extrapyramidal motor system, which involves subcortical nuclei. For this reason, genuine emotions are not associated with the cortex and are often displayed unconsciously. This is demonstrated in infants before the age of two; they display distress, disgust, interest, anger, contempt, surprise, and fear. Infants' displays of these emotions indicate that they are not cortically related. Similarly, blind children also display emotions, proving that they are subconscious rather than learned. Other subcortical facial expressions include the "knit brow" during concentration, raised eyebrows when listening attentively, and short "punctuation" expressions to add emphasis during speech. People can be unaware that they are producing these expressions.

Functional imaging studies have found that when shown pictures of faces, there is a large increase in the activity of the amygdala. The amygdala receives visual information from the thalamus via the subcortical pathways (Carlson and Neil, (2010). The amygdala may also have a significant role in the recognition of fear and negative emotions. It is believed that the emotion disgust is recognized through activation of the insula and basal ganglia. The recognition of emotion may also utilize the occipitotemporal neocortex, orbitofrontal cortex and right frontoparietal cortices Adolphs and Ralph (2002).

Thus the facial expression recognition is just the ability to recognised the right expression among many.

JUSTIFICATION OF THE STUDY

The scotopic sensitivity syndrome is a visual perception disorder and affects male and female equally. It exists on a continuum from slight to severe. Individuals who suffers with scotopic sensitivity syndrome face many difficulties such as inefficiency reading, slow reading rate, attention deficit, light sensitivity, fatigue and strain, and poor depth perception. Children and adults with this syndrome also suffer from poor academic performance due to slow reading and inefficient reading and many days to day activities such as they often misjudge steps or stairs, get confused while crossing the road, low self-esteem, poor concentration and they easily

distracted. Their working memory, attention and the ability to recognise facial expression is also suffers because of the scotopic sensitivity syndrome. Thus this investigation is an effort in this direction.

METHOD

This study would be conducted into two parts as part 'A' and part 'B'. Part 'A' would include the comparison of reading disabled children with scotopic sensitivity syndrome and their normal counter parts on working memory, attention and facial recognition. Part 'B' would include the study of effectiveness of overlays or coloured transparent sheets, tinted glasses or sceptical and mindfulness-based stress reduction upon children with scotopic sensitivity syndrome.

PART 'A'

PROBLEM

To study the working memory, attention and facial recognition among reading disabled children with scotopic sensitivity syndrome.

OBJECTIVES

- ✓ To compare the working memory of reading disabled children with scotopic sensitivity syndrome and their normal counter parts.
- ✓ To compare the attention of reading disabled children with scotopic sensitivity syndrome, and their normal counter parts.
- ✓ To compare the facial recognition of reading disabled children with scotopic sensitivity syndrome, and their normal counter parts.

HYPOTHESES

- ✓ The working memory would be deteriorated among reading disabled children with scotopic sensitivity syndrome.
- ✓ The attention would be deteriorated among reading disabled children with scotopic sensitivity syndrome.

- ✓ The facial recognition would be deteriorated among reading disabled children with scotopic sensitivity syndrome.

DEFINITION OF THE TERMS USED

Scotopic Sensitivity Syndrome: The scotopic sensitivity syndrome is a form of visual stress which lead to difficulties with fine vision tasks such as reading.

Working Memory: Working memory is the system that is responsible for the transient holding and processing of new and already stored information, an important process for reasoning, comprehension, learning and memory updating.

Attention: Attention is a condition of readiness involving especially a selective narrowing or focusing of consciousness and receptivity.

Facial Expression Recognition: Facial expression is a form of nonverbal communication and facial recognition is an ability to recognise the expression.

SAMPLE

Inclusion criteria: In the present study sample of 90 children age range from 12 to 18 from the different clinics and schools, in which 30 reading disabled children with scotopic sensitivity syndrome, 30 reading disabled children without scotopic sensitivity syndrome and 30 normal children would be taken purposively.

Exclusion criteria: In the present study children with other clinical disorder would be excluded. Children beside the age range of 12 to 18 year would be excluded.

TOOLS

Working memory: Working memory would be measured by Wechsler Intelligence Scale for Children (WISC), developed by David Wechsler (2004). It is an individually administered intelligence test for children.

The Working Memory's subtests are as follows:

- Digit Span - Children are orally given sequences of numbers and asked to repeat them, either as heard and in reverse order.
- Arithmetic (supplemental) - Orally administered arithmetic questions. Timed.

Attention: The Stroop effect test by John Ridley Stroop (1929) would be used to measure attention.

Facial Recognition: The self-constructed test would be used to measure the Facial Expression Recognition.

DESIGN

Match group design would be used.

VARIABLES

Independent variable

- ✓ Scotopic Sensitivity Syndrome

Dependent variable

- ✓ Working memory
- ✓ Attention
- ✓ Facial expression recognition

STATISTICAL ANALYSIS

Krushkal Wallis ANOVA would be used to measure the working memory, attention and facial expression recognition among reading disabled children with scotopic sensitivity syndrome, and their normal counter parts.

PART 'B'

OBJECTIVE

- ✓ To study the effect of coloured sheets or overlays, tinted lenses or spectacle and mindfulness-based stress reduction (MBSD) among reading disabled children with scotopic sensitivity syndrome.

HYPOTHESIS

- ✓ The use of coloured sheets or overlays, tinted lenses or spectacle and mindfulness-based stress reduction (MBSD) would enhance the reading ability of children with scotopic sensitivity syndrome.

DEFINITION OF THE TERM USED

Psychological Intervention: Psychological intervention are the actions performed to bring the change in people's behaviour.

SAMPLE

10 reading disabled children with scotopic sensitivity syndrome would be identified from the part 'A'. Thy would receive the facility of using coloured sheets or overlays, tinted lenses or spectacle and mindfulness-based stress reduction (MBSD).

DESIGN

Pre and post research design would be used to measuring and enhancing the effectiveness of coloured sheets or overlays, tinted lenses or spectacle and mindfulness-based stress reduction (MBSD).

TECHNIQUES

Irlenmeothd of overlays: Irlen method of colour sheets and overlays is given by Helen Irlen (1983). The Irlen filters helps in increases ability to handle paper work, complete reading and work assignments, and participate in daily activities.

Tinted glasses: In many cases it is not possible to use coloured filters for instance person can not use coloured filters while working on a black board and while crossing street and stepping the stairs. So in these cases tinted lenses or spectacles are very useful. These lenses helps in eliminating headaches and other physical symptoms, changes in depth perception, driving, copying, math, computers, and light sensitivity.

Mindfulness-Based Stress Reduction (MBSR): MBSR has been developed at the University of Massachusetts Medical Center in the 1970s by Professor Jon Kabat-Zinn, MBSR uses a combination of mindfulness meditation, body awareness, and yoga to help people become more mindful. According to Kabat-Zinn, the basis of MBSR is mindfulness, which he defined as "moment-to-moment, non-judgmental awareness". During the program, participants are asked to focus on informal practice as well by incorporating mindfulness into their daily routines. Focusing on the present is thought to heighten sensitivity to the environment and one's

own reactions to it, consequently enhancing self-management and coping. It also provides an outlet from ruminating on the past or worrying about the future, breaking the cycle of these maladaptive cognitive processes.

METHOD AND PROCEDURE

Psychological intervention would be given in managing the scotopic sensitivity syndrome in children. The children with scotopic sensitivity syndrome would be served as baseline or pre-measures for this part of the investigation. Three months' intervention would be given to the children with the sever scotopic sensitivity syndrome. Psychological intervention would include the use of Irlen coloured filters, tinted lenses and progressive muscles relaxation technique.

The Irlen filters help the subject to reduce the high contrast of the paper and able the subject to handle the paper work.

The tented lenses help the subjects in reducing the light sensitivity and improve the perception and in reducing physical symptoms in the situations where the coloured filters can notused.

Mindfulness-based stress reduction (MBSR) is a program that incorporates mindfulness to assist people with pain and a range of conditions and life issues that were initially difficult to treat in a hospital setting. Grey matter concentrations in brain regions that regulate emotion, self-referential processing, learning and memory processes have shown changes in density following MBSR. Additionally, MBSR practice has been associated with improvement of the immune system which could explain the correlation between stress reduction and increased quality of life.

ANALYSIS OF THE DATA

Wilcoxon sign rank test would be used.

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